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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/574,573

04/04/2006

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EXAMINER

BERNATZ, KEVIN M

ART UNIT

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1794

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/574,573	Applicant(s) MAEDA ET AL.	
	Examiner Kevin M. Bernatz	Art Unit 1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 February 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 9-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 19 and 20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-20 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>4/4/06; 9/17/08</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicants' election without traverse of Group I (claims 1 – 8, 19 and 20) in the paper filed February 5, 2009 is acknowledged. Claims 9 – 18 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 3, 4 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moriwaki et al. (U.S. Patent App. No. 2003/0219630 A1), alone or further in view of Applicants' admissions.

Regarding claim 1, Moriwaki et al. disclose a perpendicular magnetic recording medium (*Title*) comprising a substrate (*Abstract*), at least one underlayer (*Paragraph 0053*) formed above the substrate, and a perpendicular magnetic recording layer (*Abstract*) formed above the at least one underlayer, an easy magnetization axis of the perpendicular magnetic recording layer being oriented perpendicular to the substrate

(i.e. the definition of a perpendicular magnetic recording layer, which is what Moriwaki et al. discloses – see Paragraph 0018), the perpendicular magnetic recording layer including magnetic crystal particles and grain boundaries surrounding the magnetic crystal particles (*Figure 1 and relevant disclosure thereto*), wherein the grain boundaries contain an oxide (*Paragraphs 0019 – 0021*) wherein the amount of material in the grain boundary region is controlled to be within 1 – 20 mol% (*see examples*).

While Moriwaki et al. disclose silicon oxides, as well as elements meeting Applicants' claimed Markush limitation, and overall mol% additives, Moriwaki et al. fail to explicitly teach a mixture of silicon oxide and another oxide meeting the claimed composition and mol% limitations.

However, the Examiner deems that a single oxide and a mixture of silicon oxide and another oxide meeting the claimed limitations are known functional equivalents in the field of suitable oxide materials to segregate granular magnetic grains, as taught by Moriwaki et al. (*Paragraphs 0019 – 0020*). Furthermore, the Examiner notes that Applicants' admissions provides guidance towards oxides of alkaline earth metals (e.g. *Ca, Sr and Ba*) per the admission that the prior art recognizes these compounds as also serving as suitable grain segregants (*page 3 of specification, lines 9 – 11*).

Substitution of functional equivalents requires no express motivation as long as the prior art recognizes the functional equivalency. In the instant case, a single oxide and a mixture of oxides meeting Applicants' claimed limitations are functional equivalents in the field of oxide segregants suitable for use in a granular magnetic recording medium. *In re Fount* 213 USPQ 532 (CCPA 1982); *In re Siebentritt* 152

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USPQ 618 (CCPA 1967); *Graver Tank & Mfg. Co. Inc. v. Linde Air Products Co.* 85

USPQ 328 (USSC 1950).

Regarding the exact amount of Si and the other elements selected from Applicants' claimed Markush group, Moriwaki et al. teach the importance of controlling the total molar amount of the segregant material in order to insure good grain isolation and good magnetic characteristics (*Paragraph 0022 and examples*). The Examiner deems that it would have been obvious to one having ordinary skill in the art to have determined the optimum value of a results effective variable such as the total amount of Si and the elements meeting Applicants' claimed Markush limitations through routine experimentation, especially given the teaching in Moriwaki et al. regarding the desire to control the amount of total segregant material to insure good grain isolation and magnetic characteristics. *In re Boesch*, 205 USPQ 215 (CCPA 1980); *In re Geisler*, 116 F. 3d 1465, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997); *In re Aller*, 220 F.2d, 454, 456, 105 USPQ 233, 235 (CCPA 1955).

It would therefore have been obvious to one of ordinary skill in the art at the time of the Applicant(s) invention to modify the device of Moriwaki et al. to produce a granular structure meeting Applicants' claimed limitations as taught by Moriwaki et al. alone, or also in view of Applicants' admissions, since such a structure is a known functional equivalent and can possess good grain isolation and magnetic characteristics.

Regarding claim 3, Moriwaki et al. disclose magnetic crystal particles meeting Applicants' claimed limitations (*examples*).

Regarding claim 4, Moriwaki et al. disclose underlayers meeting Applicants' claimed limitations (*Paragraph 0053*).

Regarding claim 19, the Examiner notes that the recited apparatus limitation ("a read/write head") is a nominal apparatus limitation that is within the knowledge of one of ordinary skill in the art as old in the art, since a read/write apparatus will necessarily require a read/write head to function.

4. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Moriwaki et al. alone, or in view of Applicants' admissions, as applied above, and further in view of Kikitsu et al. (U.S. Patent No. 5,652,054).

Moriwaki et al. and Applicants' admissions are relied upon as described above.

None of the above disclose the total amount of the substance at the grain boundaries.

However, Kikitsu et al. teach a granular magnetic layer wherein the percentage of the magnetic substance at the grain boundary is 5% or less, preferably 0%; and wherein the percentage of the nonmagnetic oxide segregant in the magnetic grain is also 5% or less, preferably 0% (*Figures 4 – 6; co. 11, line 51 bridging col. 12, line 26; and examples*). The Examiner notes this is essentially teaching that all of the magnetic material should be in the magnetic grain, and all of the non-magnetic segregant material should be in the grain boundary region. Since the Examiner maintains that it would be obvious to add 1 – 20 mol% total of grain segregant material meeting the claimed limitations, it would also be obvious to insure that the grain boundary region would meet

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the claimed limitations - since all the added 1 - 20 mol% would be preferentially found at the grain boundary region per the teaching of Kikitsu et al. above.

5. Claims 5 – 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moriwaki et al., alone or in view of Applicants' admissions, as applied above, and further in view of Kokubu et al. (JP 2002-334424 A) and Oikawa et al. (U.S. Patent No. 6,696,172 B2). See provided Derwent Abstract translation for JP '424 A.

Moriwaki et al. and Applicants' admissions are relied upon as described above.

None of the above disclose an underlayer meeting the claimed limitations.

However, Kokubu et al. teach an underlayer for a perpendicular recording medium comprising Ru-SiO₂ for improving the crystal growth properties and magnetic characteristics of the subsequently deposited magnetic layer (*see Derwent Abstract and Paragraph 0019 of Japanese language document*). It is unclear whether the Ru portion is crystalline, but the Examiner notes that Oikawa et al. teach forming a granular non-magnetic underlayer comprising non-magnetic grains segregated by a non-magnetic oxide for use under granular magnetic layers (*same as in both Kokubu et al. and Moriwaki et al.*). Oikawa et al. further teach that the same general granular structure should be used for both the granular underlayer and the granular magnetic layer in order to reduce the noise and increase coercive force, H_c (*col. 3, line 55 bridging col. 4, line 2*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the Applicant(s) invention to modify the device of Moriwaki et al., alone or in view of

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Applicants' admissions, to use a non-magnetic underlayer meeting Applicants' claimed material and structural limitations as taught by Kokubu et al. and Oikawa et al., since such a structure would produce a recording medium having improved magnetic performance and reduced noise.

Regarding claims 6 - 8, while none of the above references explicitly disclose forming a dual oxide material meeting the claimed limitations, the Examiner deems that such a segregant material would have been obvious to one of ordinary skill in the art for substantially the same reasons as cited above – namely that mixed oxides are known functional equivalents and one of ordinary skill in the art would have been motivated to use the same segregant material to reduce cost while insuring that the underlayer and the magnetic layer would possess the same granular structure (*as taught by Oikawa et al., above*).

6. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Moriwaki et al., alone or in view of Applicants' admissions, as applied above, and further in view of Shimizu et al. (U.S. Patent App. No. 2002/0160232 A1).

Moriwaki et al. and Applicants' admissions are relied upon as described above.

None of the above disclose a single pole head.

However, the Examiner takes Official Notice that single pole magnetic heads for perpendicular magnetic recording is old in the art, as taught by Shimizu et al. (*Paragraph 0137*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the Applicant(s) invention to modify the device of Moriwaki et al., alone or in view of Applicants' admissions, to utilize a single pole magnetic head as claimed, since the use of such poles in a perpendicular read/write head is old in the art.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to Applicants' disclosure. Wu et al. (U.S. Patent No. 7,429,427 B2) teaches a granular magnetic recording medium formed from mixed oxides (*see claims*), but fails to qualify as prior art. Ranjan et al. (U.S. Patent No. 5,736,013) teach a granular magnetic layer which can be formed from any oxides or nitrides, *per se* (*col. 10, lines 1 - 20*).

8. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Kevin M. Bernatz whose telephone number is (571) 272-1505. The Examiner can normally be reached on M-F, 9:00 AM - 5:30 PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Rena Dye can be reached on (571) 272-3186. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Kevin M Bernatz/
Primary Examiner, Art Unit 1794

May 2, 2009